

# Benralizumab-resistant mucus plugs in severe asthma complicated by eosinophilic chronic rhinosinusitis

Masamitsu Hamakawa  | Tadashi Ishida

Department of Respiratory Medicine, Kurashiki Central Hospital, Okayama, Japan

## Correspondence

Masamitsu Hamakawa, Department of Respiratory Medicine, Kurashiki Central Hospital, 1-1-1 Miwa, Kurashiki, Okayama 710-8602, Japan.  
Email: [mh16976@kchnet.or.jp](mailto:mh16976@kchnet.or.jp)

Associate Editor: Francesca Gonnelli

## Key message

It is an absolute necessity to achieve complete control of comorbidities to obtain optimal asthma control. Importantly, type 2 asthma and ECRS share the same inflammatory pathophysiology and are common co-morbidities. If the initial biologic is insufficiently effective, it is worth considering an alternative biologic.

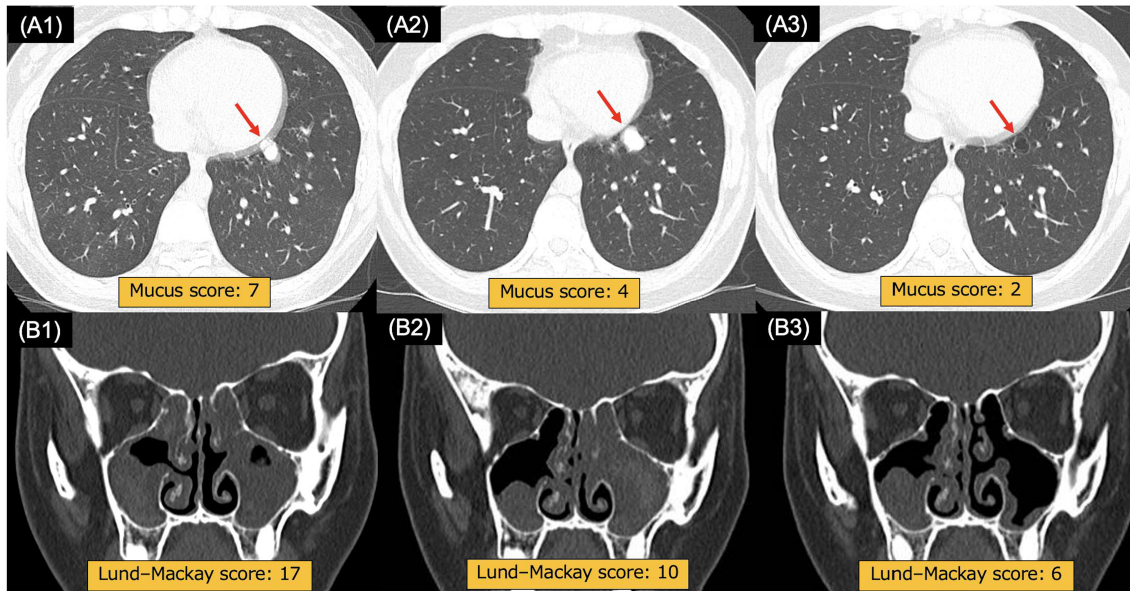
## KEYWORDS

asthma, benralizumab, dupilumab, mucus plug, nasal polyp

## CLINICAL IMAGE

The present case was a 33-year-old woman with severe asthma and eosinophilic chronic rhinosinusitis (ECRS).

Despite treatment with high-dose inhaled steroids, long-acting bronchodilators, and leukotriene antagonists for several years, she had a wet cough and had lost most of her sense of smell. Her asthma control test (ACT) score was 15.



**FIGURE 1** Computed tomography (CT) images showing change in the appearance of a mucus plug and eosinophilic chronic rhinosinusitis before and after administration of biologics. (A1) CT of the chest obtained before biologics administration shows a large mucus plug (arrow). Mucus score is seven. (A2) CT of the chest obtained after 10 months of benralizumab administration shows a slightly enlarged residual mucus plug (arrow). Mucus score is four. (A3) CT of the chest obtained 2 months after switching from benralizumab to dupilumab shows disappearance of the residual mucus plug (arrow). Mucus score is two. (B1) CT of the sinuses obtained before biologics administration shows soft shadows in the maxillary and ethmoidal sinuses. Lund-Mackay score is 17. (B2) CT of the sinuses obtained after 10 months of benralizumab administration shows partial disappearance of the soft shadows in the right maxillary sinus. Lund-Mackay score is 10. (B3) CT of the sinuses obtained two months after switching from benralizumab to dupilumab shows disappearance of the soft shadows in the left maxillary sinus. Lund-Mackay score is 6.

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Author(s). *Respirology Case Reports* published by John Wiley & Sons Australia, Ltd on behalf of The Asian Pacific Society of Respiriology.

Biomarkers of type 2 inflammation were immunoglobulin E, 61 IU/mL (normal, < 361 IU/mL); peripheral blood eosinophils, 336/ $\mu$ L; and FeNO, 187 ppb. Chest computed tomography (CT) showed mucus plugs (Figure 1A1). Mucus score was seven.<sup>1</sup> Sinus CT showed soft shadows in the maxillary and ethmoidal sinuses (Figure 1B1). Lund–Mackay score was 17. Benralizumab was started as additional therapy. After 10 months of benralizumab administration, her ACT score improved from 15 to 19, mucus score from 7 to 4, and Lund–Mackay score from 17 to 10 (Figure 1B2). However, the loss of sense of smell and wet cough persisted, and chest CT showed a slightly enlarged residual mucous plug (Figure 1A2). Two months after switching from benralizumab to dupilumab, the ACT score improved from 19 to 25, mucus score from 4 to 2, and Lund–Mackay score from 10 to 6 (Figure 1B3). Chest CT showed disappearance of the residual mucus plug (Figure 1A3). It is an absolute necessity to achieve complete control of comorbidities to obtain optimal asthma control. Importantly, type 2 asthma and ECRS share the same inflammatory pathophysiology and are common co-morbidities.<sup>2</sup> As dupilumab has been shown to be effective in both type 2 asthma and chronic sinusitis with nasal polyps,<sup>2</sup> it is an effective treatment option. Although benralizumab has shown efficacy for mucus plugs,<sup>3</sup> the response may be inadequate in some patients, as in the present case. An alternative biological therapy can be considered in such cases.

#### AUTHOR CONTRIBUTIONS

MH wrote the manuscript. MH and TI contributed to data collection. All authors read and approved the final manuscript.

#### ACKNOWLEDGMENTS

The authors thank FORTE Science Communications (<https://www.forte-science.co.jp/>) for English language editing.

#### CONFLICT OF INTEREST STATEMENT

None declared.

#### DATA AVAILABILITY STATEMENT

Research data are not shared.

#### ETHICS STATEMENT

The authors declare that appropriate written informed consent was obtained for the publication of this manuscript and accompanying images.

#### ORCID

Masamitsu Hamakawa  <https://orcid.org/0009-0002-4635-4034>

#### REFERENCES

1. Dunican EM, Elicker BM, Gierada DS, Nagle SK, Schiebler ML, Newell JD, et al. Mucus plugs in patients with asthma linked to eosinophilia and airflow obstruction. *J Clin Invest*. 2018;128:997–1009.
2. Laidlaw TM, Bachert C, Amin N, Desrosiers M, Hellings PW, Mullol J, et al. Dupilumab improves upper and lower airway disease control in chronic rhinosinusitis with nasal polyps and asthma. *Ann Allergy Asthma Immunol*. 2021;126:584–92.
3. McIntosh MJ, Kooner HK, Eddy RL, Wilson A, Serajeddini H, Bhalla A, et al. CT mucus score and <sup>129</sup>Xe MRI ventilation defects after 2.5 years' anti-IL-5R $\alpha$  in eosinophilic asthma. *Chest*. 2023;164:27–38.

**How to cite this article:** Hamakawa M, Ishida T. Benralizumab-resistant mucus plugs in severe asthma complicated by eosinophilic chronic rhinosinusitis. *Respirology Case Reports*. 2024;12(8):e70009. <https://doi.org/10.1002/rcr2.70009>